DARPATech '97

DARPA's Unmanned Tactical Vehicle Activities

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Unmanned Combat Air Vehicle (UCAV)

Goal: **Develop & Demonstrate a UCAV System to Effectively & Affordably Prosecute 21st Century SEAD & Strike Missions**

Vision:

- **Affordable Airpower**
  - Lower Acquisition Cost
  - Significantly Lower O&S Cost
- **Expanded Range of Mission Options**
  - High Risk/High Payoff Missions
  - Persistent SEAD/Strike Concept
- **Increased Tactical Deterrence**
  - Fundamentally Superior Vehicles
  - Fully Exploit Information Revolution
  - Create "No Win" Deterrence

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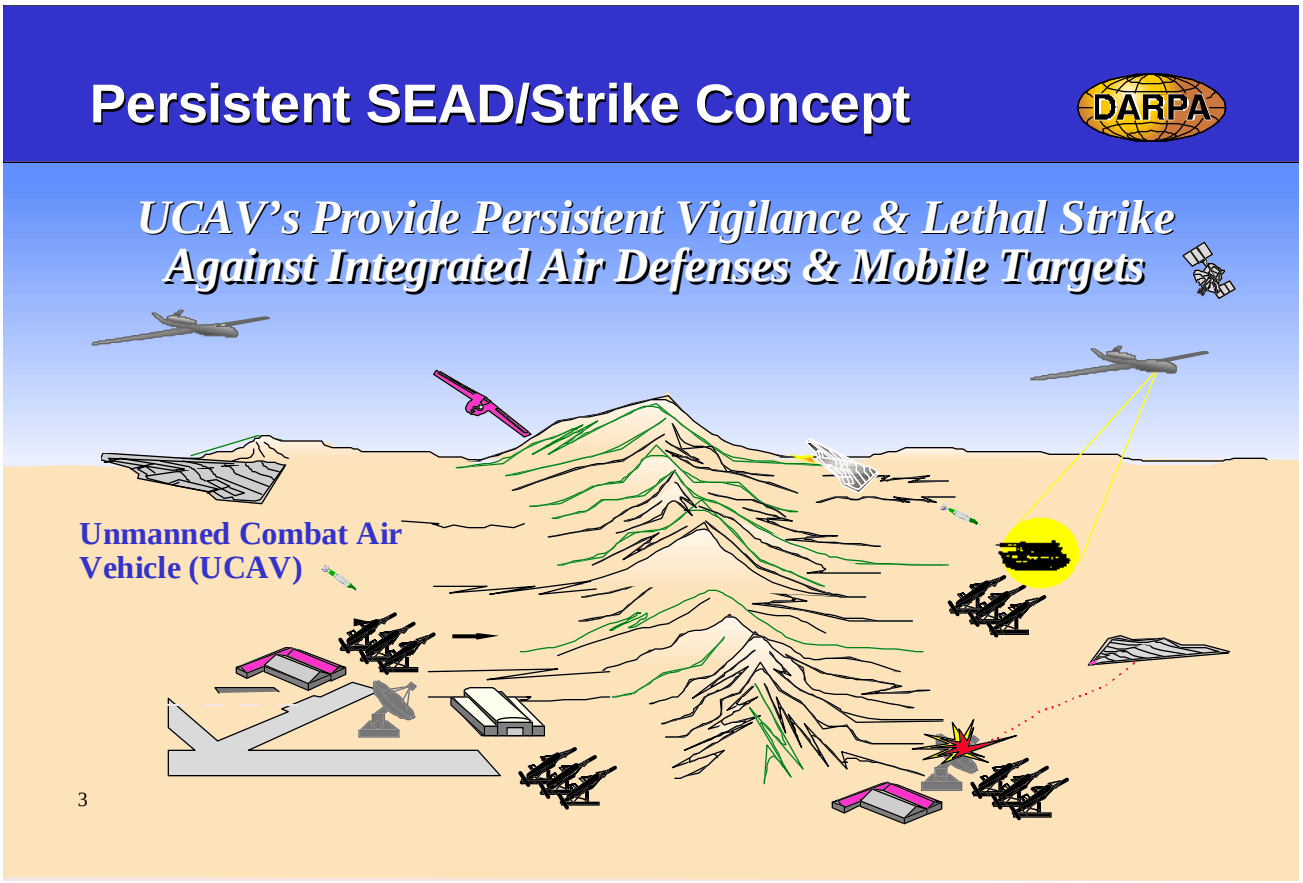
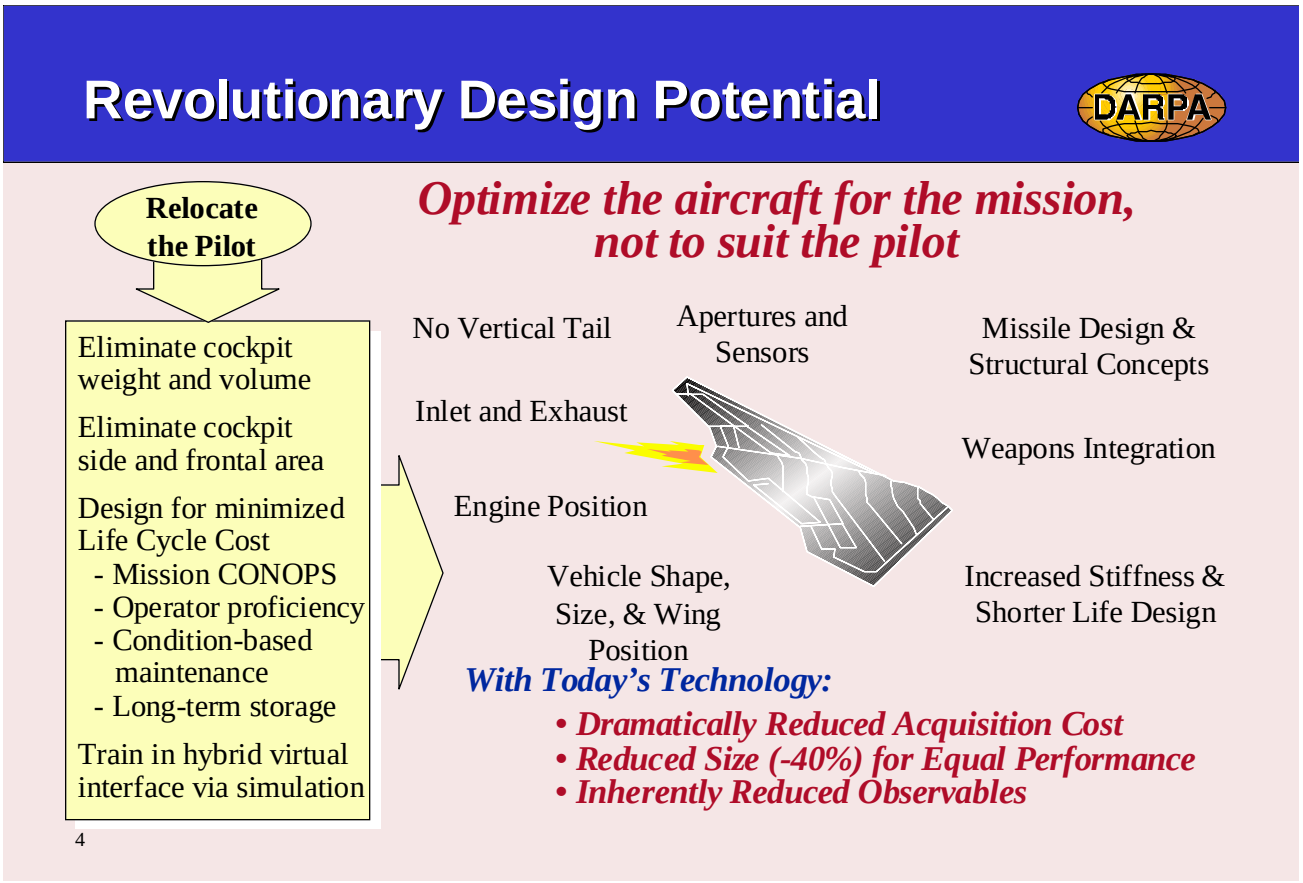
The Air Force has a critical need for highly survivable, affordable and effective air power to conduct suppression of enemy air defense (SEAD) and lethal strike against 21st century targets. In conjunction with the Air Force, the Defense Advanced Research Projects Agency (DARPA) is in the process of initiating a program with the goal of satisfying this need with an Unmanned Combat Air Vehicle (UCAV).

The vision UCAV will ultimately provide affordable airpower by reducing acquisition cost and significantly lowering operations and support (O&S) costs. As an unmanned asset, UCAV will enable an expanded range of mission options. High risk/high payoffs missions can be prosecuted without the risk to human pilots, and a persistent lethal capability is provided for the prosecution of time critical targets. The vision UCAV will also offer new concepts for tactical deterrence. With the coming of the information revolution and continuing presence, the adversaries will know that they cannot win. If they expose themselves in any manner, U.S. sensor platforms will find them, and UCAVs will prosecute them.



UCAVs will provide persistent vigilance and lethal strike against intregrated air defenses and mobile targets throughout the air campaign. During the high threat, early phases of an engagement, the UCAV will penetrate the adversary's air defenses and provide pre-emptive and reactive SEAD and prosecute high valve targets deep within the adversary's domain. Throughout the remainder of the campaign, an affordable and effective UCAV asset enables a continuous presence for immediate prosecution of real time and time critical targets. A system capable of effectively performing these mission objectives would provide a "no win" tactical deterrence against which an enemy's defenses would be ineffective.



UCAVs provide an opportunity for revolutionary aircraft design potential without considering the physiological constraints imposed by the pilot. By relocating the human pilot from the cockpit, the vehicle can be optimized for minimum life cycle cost by tailoring mission concepts of operations, design philosophies and vehicle configuration. A UCAV can perform equivalent missions to a manned aircraft at substantially reduced cost and size, with inherently reduced observables.

ATD Technical Objectives

Design, Fabricate & Flight Test an Affordable UCAV System and Develop & Demonstrate the Key Technologies Required to Effectively Perform SEAD/Strike Missions in the 2010 Timeframe.

- Demonstrate Robust/Secure Command, Control & Communications
- Explore the Full Range of Man-In-The-Loop & Mission Planning Approaches
- Evaluate Sensors, Weapon Loadouts & Mission Effectiveness
- Demonstrate Real Time Targeting and Weapons Delivery
- Demonstrate an Affordable SEAD/Strike UCAV System Concept

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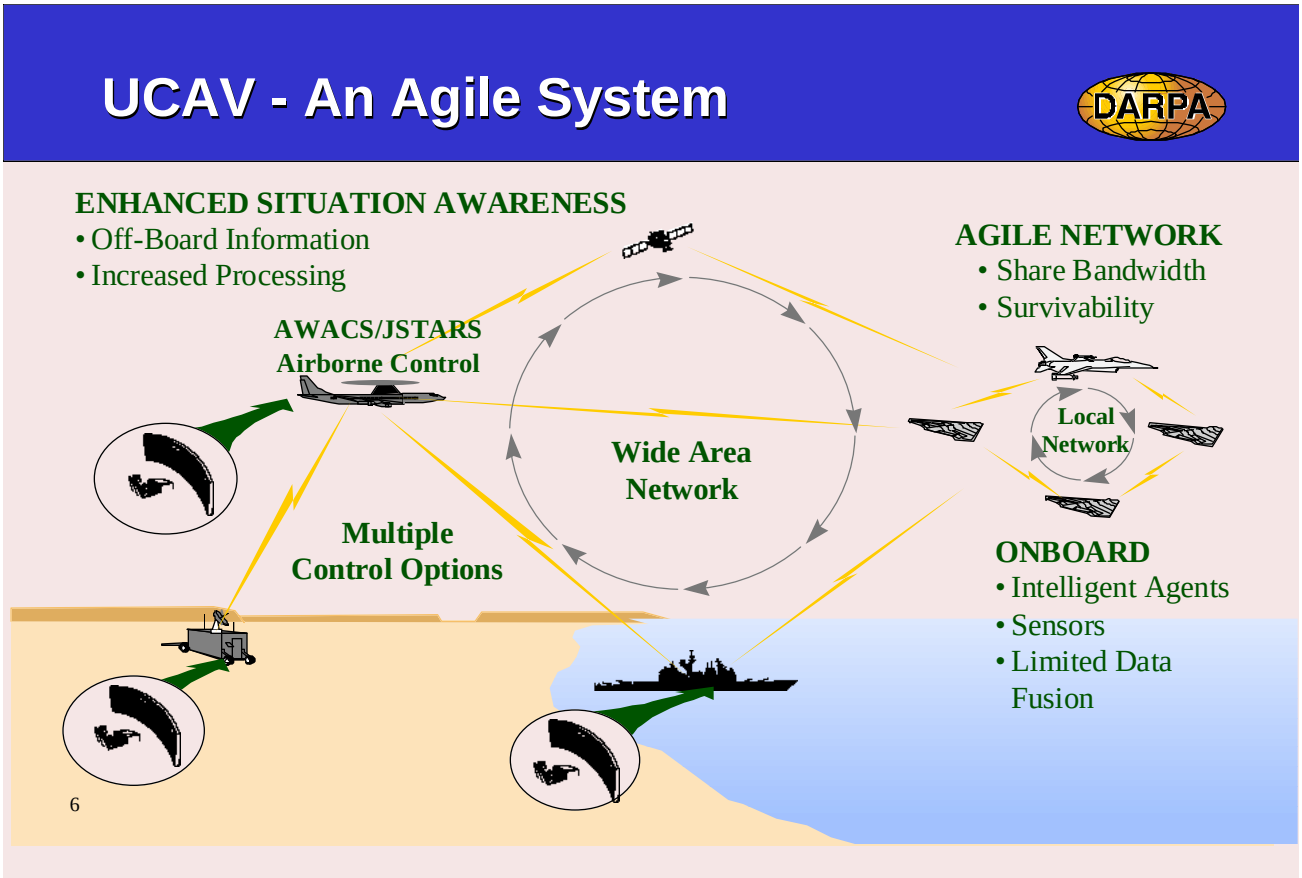
Recent studies, including the Air Force Long Range Plan, the Air Force Science Advisory Board Report on UAV Technologies and Combat Operations and multiple other DARPA & USAF studies, have recommended the development and demonstration of a UCAV system capable of performing these missions. The goal of the joint DARPA/Air Force UCAV ATD is to develop and demonstrate a UCAV system for the effective and affordable prosecution of 21st century SEAD/strike missions.

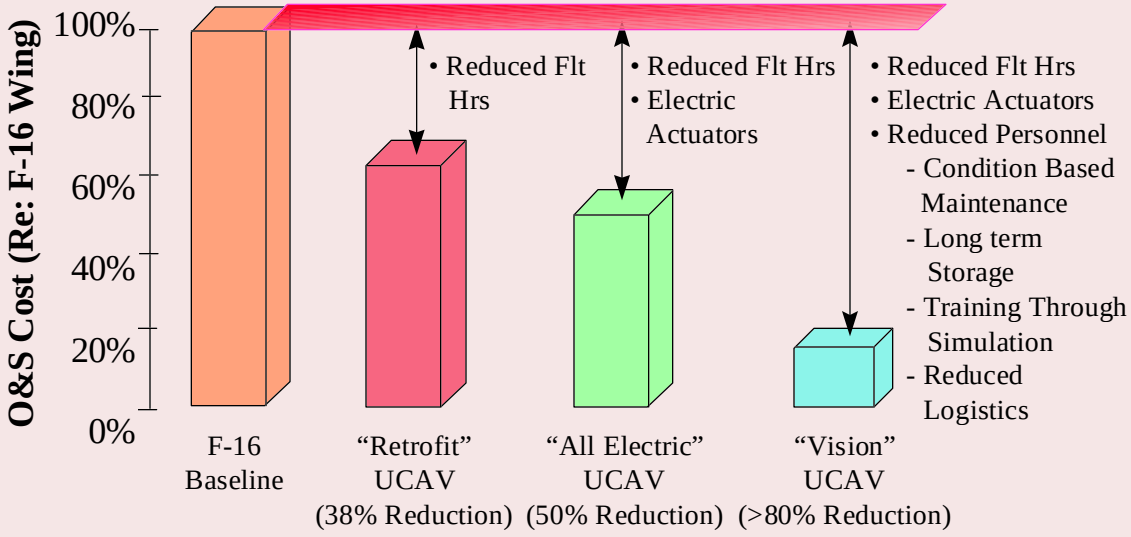
The objectives of the ATD are to design and fabricate an affordable UCAV system and to develop and demonstrate the key command, control and communications, human-systems interaction, and weapons delivery technologies required to effectively perform SEAD/strike missions in the 2010 timeframe. The system must be equal to, or more effective than, current manned systems yet capable of reliably performing the mission with a significantly lower total Life Cycle Cost (LCC). The intent of the Statement of Objectives (SOO) will be to provide an appropriate framework of design and performance objectives to allow the contractors maximum flexibility in their trades for this lowest LCC solution.



A key component of this ATD will be an agile system that allows variable levels of command and control, situation awareness and communications. This control architecture will be modular to allow multiple control options for operational flexibility. The location of the control station and the degree of autonomy between the station and air vehicle will be variable to facilitate exploration of general UCAV control scenarios.

The system must also demonstrate/possess a large degree of communications agility. This capability is required to satisfy the need to explore bandwidth issues and the appropriate allocation of sensors and information for enhanced situation awareness. The use of the intelligent systems onboard the UTA will allow it to operate in an autonomous mode for much of the mission, enhancing the ability to dynamically re-allocate bandwidth and reducing the overall requirement.

O&S Cost Savings



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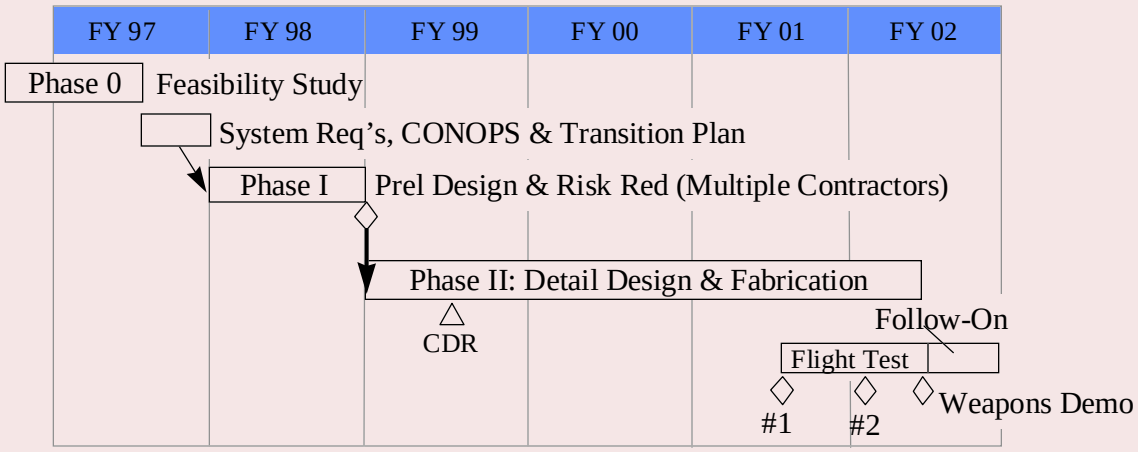
The opportunity exists to significantly lower operations and support (O&S) costs. Pilots will train through simulation using the exact same interface that would be utilized during normal operations. This results in reduced flight hours since the UCAV is only actually being flown during conflicts, exercises, or to maintain the vehicle's flight-ready status. Design philosophies utilizing more electric vehicle technologies and new long-term storage concepts will require less infrastructure.

UCAV Program Approach



- **Design, Fabricate & Flight Test 2 UCAV Demonstrators With Signature Compatible Shaping But No Materials or Treatments**
- **Low Risk Flight Test Approach**
  - Full Pilot-In-The-Loop for Initial Envelope Expansion
  - Systematic Build-Up to Semi-Autonomous Operations
- **Demonstrate and Validate Technical Objectives**

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The UCAV ATD will be structured in two phases.

During Phase I, multiple contractors will perform requirements analysis, design trade studies, risk reduction activities and will propose a preliminary design of a UCAV system.

Phase II will be conducted from a rolling downselect, based on Phase I results, for the detailed design, fabrication, ground and flight test. Two UCAV demonstrators will be fabricated with signature compatible shaping but no materials and treatments. A low risk flight test approach will be incorporated to ensure the successful demonstration and validation of program objectives.

Acquisition Strategy

- Multiple Phase I Contracts Awarded - 1st Qtr FY98
  - DARPA Section 845 Agreements With Phase II Options
- Downselect at PDR to 1 or More Contractors for Phase II - 1st Qtr FY99
- Rolling Downselect In FY99 to 1 Contractor For Detailed Design, Fab & Flight Test of 2 Air Vehicles & Ground Station
- First Flight: 2nd Qtr FY01
  - Program Management Transitions to Air Force for Further System Evalutions Following Initial Flight Tests
- Anticipated Program Approximately $125M

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To execute the ATD program, DARPA will award multiple Section 845 agreements for Phase I. These agreements will include Phase II options to enable a rolling downselect for detailed design, fabrication and testing. Initial flight tests are envisioned for the 2nd quarter of FY01. Following the completion of initial flight test technical objectives, the program will transition to the Air Force for follow-on risk reduction and operational analysis.